COWS center on wisconsin strategy

building a high road economy in Wisconsin and beyond.

Biobased Industry in Wisconsin: Briefing Paper

Presented to the

Governor's Consortium on Biobased Industry

December 12, 2005

Consulting Team:

Energy Center of Wisconsin

in collaboration with:

Center for Technology Transfer

Center on Wisconsin Strategy

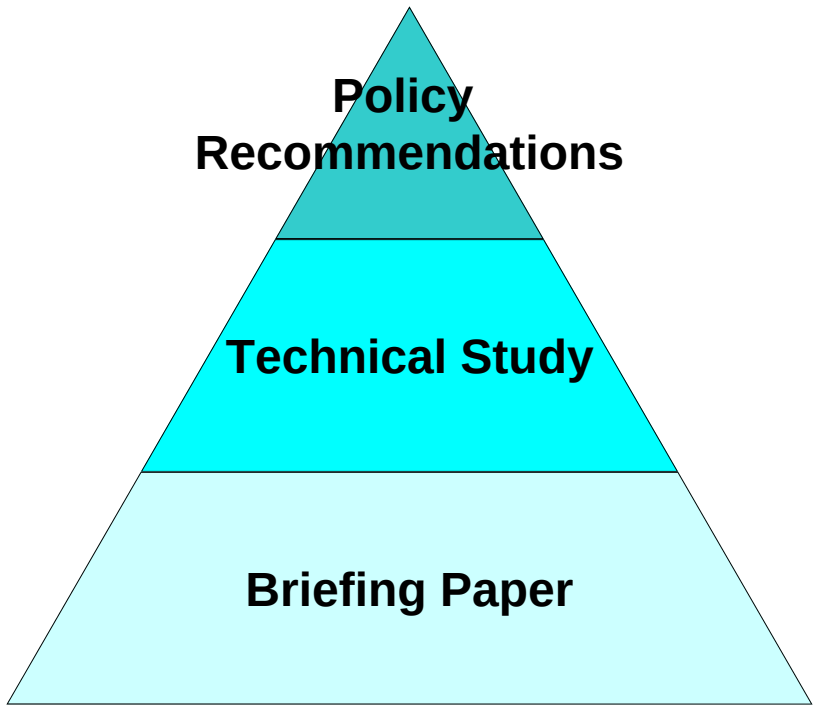
GDS Associates, Inc.

Resource Strategies, Inc.

Documents Presented:

- Briefing Paper
  - Background and context
  - Overview of WI resources
- Technical Report
  - Technical analysis of WI feedstocks, processes, and potential bioproducts
- Policy Recommendations
  - Recommendations for policies to move bioeconomy forward in Wisconsin

Document Relationship:



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Role of the Briefing Paper

- Provide political/policy context for biobased economy
- Provide background on global, regional, and state efforts that currently exist to support biobased economy
- Examine features of the state that could support a biobased economy, including land and human resources

Terms

- “Bioeconomy”: economy based on turning biomass into value-added products, including energy, fuel, chemicals

- “Bioindustry”: any industry operating within the bioeconomy. Includes industries involved in biomass growing, processing, and end product manufacturing and use.

Why Develop a Bioeconomy?

- Energy independence
- Rising fuel costs and price instability
- Regional economic development
- Benefits to farms and forestry operations
- Environmental benefits
- Technological innovation, especially in petrochemical substitutes

Example: Gas $$ Leaving WI

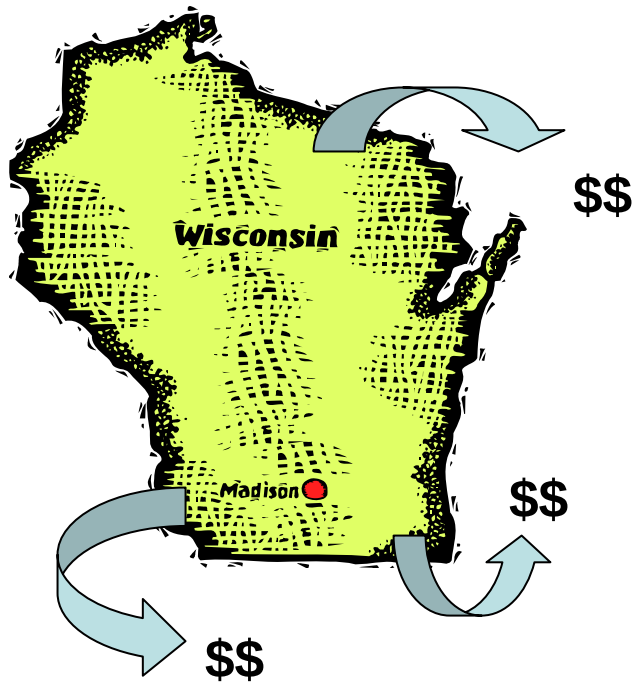
6.8 million gallons of gasoline per day in WI in 2001

X

$1.50/gallon (average price of gasoline 2001)

=

$10.2 million/day leaving Wisconsin for other states and countries



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Elements of a Successful Bioeconomy

- Strengthen existing industries
- Generate new industry
- Strengthen links among industries
- Generate private investment
- Create high-quality jobs
- Generate wealth in rural areas
- Increase trade
- Improve the environment

Other countries, states are getting on the bioeconomy train…

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International Efforts

- **Bioenergy:**
  - Long used for heat and cooking in developing countries
  - India and others now earning Kyoto credits for family-scale biogas systems
  - EU investing heavily in community-scale biobased power
    - 38.5 MW poultry litter system in London
- **Biofuels:**
  - Brazil and U.S. lead in ethanol production
  - EU leads in biodiesel production
  - On horizon: commercial-scale cellulosic ethanol

International Efforts, cont.

- Bioproducts:
  - Most countries focusing on building infrastructure to support emerging technologies
    - Ex: Canada, Australia have govt/industry/academia partnerships
  - U.S. DOE released list of top value-added chemicals from sugars as roadmap to this research
  - Private companies hold many bioproduct patents; difficult for governments to capitalize on these

Treaties to Watch

- **Kyoto Protocol**
  - Potential to create market for bioproducts
  - U.S. is outside this market
- **WTO talks on agriculture subsidies**
  - Targets both exports and domestic support programs
  - Unclear whether government incentives for bioindustry processing (e.g. ethanol plants) will be included
- **CAFTA and other investment agreements**
  - Create competition for feedstocks and end products
  - May also allow investor countries to challenge regulations and subsidies

U.S. Efforts

Policies providing key incentives and regulations:

- Farm Bill
- Energy Bill
- Biobased Products and Bioenergy Coordination Council (BBCC) programs
- Federal Biobased Products Preferred Procurement Program (FB4P)

Current U.S. focus: cellulosic ethanol, biochemicals

Our Neighbors

- **Regional Consortia:**
  - Midwest Consortium for Sustainable Biobased Products and Bioenergy
  - Sun Grant Initiative
  - Great Lakes Biomass State-Regional Partnership
- **Illinois:** AgTech initiative; 2005 biodiesel procurement requirement for all levels of government
- **Indiana:** 2005 plan to become "Texas of alternative fuels"; biodiesel and ethanol production goals
- **Iowa:** Biobased Products and Bioenergy Vision and Roadmap; BIOWA
- **Michigan**: MSU Center for Plant Products and Technology
- **Minnesota:** U-Minn Center for Biorefining; RFS for ethanol and biodiesel sales

Wisconsin Efforts

- Renewable Portfolio Standard
- Public Benefits Fund
- Tax Credits for Agriculture/Forestry
- Ethanol Production Subsidy (sunsets 6/06)
- Tax deductions for AFVs
- Council on Forestry
- Clean Cities program
- Task force on EE and Renewables
- Biobased Economy Consortium
- Working Lands Initiative

Wisconsin's Potential to Compete

- Existing Land Resources:
  - 45% of state is farmland
  - 46% of state is forest
- Human Capital to Anchor Bioindustry:
  - High labor force participation
  - Skilled workforce in manufacturing
  - Workforce development system including DWD, regional job centers
  - Technical College system spread across state (47 campuses)

WI Advantage, Cont.

- Strong Research & Development Potential:
  - UW system (26 campuses)
  - UW Extension
  - Federal labs (FPL, Dairy Forage Research Center)
  - Private industry
- Distinctiveness in Feedstock, Product Use Aspects of Biobased Industry

LQs and Local Distinctiveness

- Location Quotient: ratio between share of workers in an industry in WI and share of workers in the same industry in the U.S.
- LQ over 1.0 Indicates local distinctiveness in a particular industry
  - Example: LQ for cheese manufacturing is 16.8 – therefore a Wisconsin worker is 16.8 times more likely to work in cheese manufacturing than a U.S. worker.

Top Biobased LQs

Bioindustry Codes: F = feedstock (may be anchor, supplemental, or marginal); PROC = involved in bioindustry process; PROD? = potential end user of biobased products

Bioindustry Code 1	Bioindustry Code 2	sector	Description	Industry employment in WI	WI Location Quotient
F		63	Creamery butter manufacturing	853	19.7
F		50	Malt manufacturing	430	19.1
F		64	Cheese manufacturing	13072	16.8
F		125	Paper and paperboard mills	23003	7.4
PROD?		164	Polish and other sanitation good manufacturing	3846	7.3
F		117	Wood windows and door manufacturing	9761	6.3
F	PROD?	129	Coated and laminated paper and packaging materials	6203	6.2
F		57	Confectionery manufacturing from cacao beans	885	4.8
F		68	Meat processed from carcasses	9907	4.2
F		135	All other converted paper product manufacturing	1526	3.9
F		366	Institutional furniture manufacturing	2439	3.8
F		122	Prefabricated wood building manufacturing	1999	3.8
F		65	Dry, condensed, and evaporated dairy products	1181	3.6
F		11	Cattle ranching and farming	49699	3.4
F		134	Sanitary paper product manufacturing	2426	3.4
PROD?		198	Abrasive product manufacturing	875	3.4
F		123	Miscellaneous wood product manufacturing	2059	3.2
PROD?		110	Footwear manufacturing	1532	3.2
F		60	Frozen food manufacturing	5955	3.1
PROD?		172	Plastics packaging materials, film and sheet	5516	3.0
F		61	Fruit and vegetable canning and drying	5827	3.0

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Other distinctive industries

- Breweries (2.4)
- Grain farming (1.7)
- Logging (1.7)
- Vegetable and melon farming (1.5)
- Oilseed farming (1.1)

Industry Strength by GSP (in millions of dollars, 2003)

Industry	WI	IL	IN	IA	MI	MN
Total Gross State Product	**$186,350**	**$470,101**	**$201,263**	**$95,569**	**$340,972**	**$198,526**
Agriculture, forestry, fishing, and hunting	2,678	2,810	1,791	3,067	1,632	2,623
Crop and animal production (Farms)	2,162	2,438	1,556	2,797	1,199	2,191
Forestry, fishing, and related activities	524	362	233	274	433	433
Mining	255	982	720	164	551	475
Oil and gas extraction	2	49	8	0	197	(L)
Mining, except oil and gas	253	893	705	163	286	474
Support activities for mining	(L)	40	6	1	70	1
Utilities	3,120	10,377	4,466	2,244	7,193	2,837
Manufacturing	43,631	66,223	58,358	20,510	76,418	28,807

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State weakness in chemical mfg

	WI	IL	IN	IA	MI	MN
LQ	0.77	1.31	1.66	0.72	0.93	0.53
GSP (in millions)	$2,968	$7,508	$9,450	$2,833	$3,844	$892

Potential Bioeconomy Jobs

Biomass Co-firing:

- 3-21 fulltime jobs/MW over 10 years
- Jobs include: growing, harvesting, transport, inspection, equipment operation, accounting
- Job numbers are higher for switchgrass, poplar, willow feedstocks than for wood wastes (more new growing/collection jobs)

Ethanol Plants:

- Average 34 jobs/plant
- Jobs include: plant managers, lab techs, O&M workers, instrument technicians
- Number of jobs depends on size and age of plant

Methane Digesters

- Average jobs per MW:
  - 3.7 construction jobs – 20% local jobs
    - Likely to be short-term jobs
  - 2.3 O&M jobs – 50% local jobs
    - Likely to be longer-term jobs

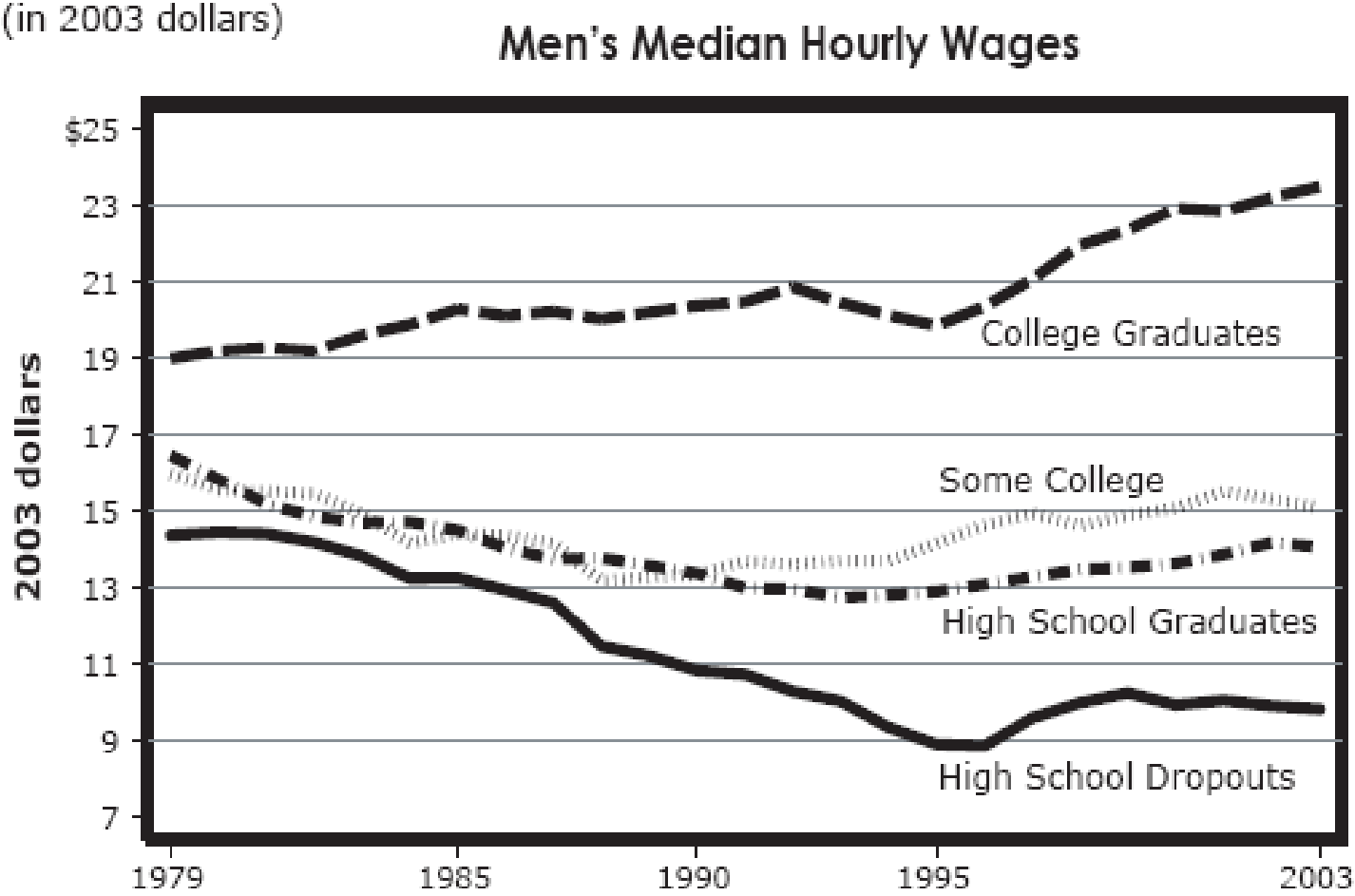
WI Labor Force Demographics: Education

Education (2003):

	Wisconsin	U.S.
Less than HS	10.4%	12.8%
High School	34.7%	30.4%
Some College	30.5%	28.3%
Bachelor's or higher	24.4%	28.5%

Wisconsin Median Hourly Wages, by Sex and Education, 1979–2003

(in 2003 dollars)



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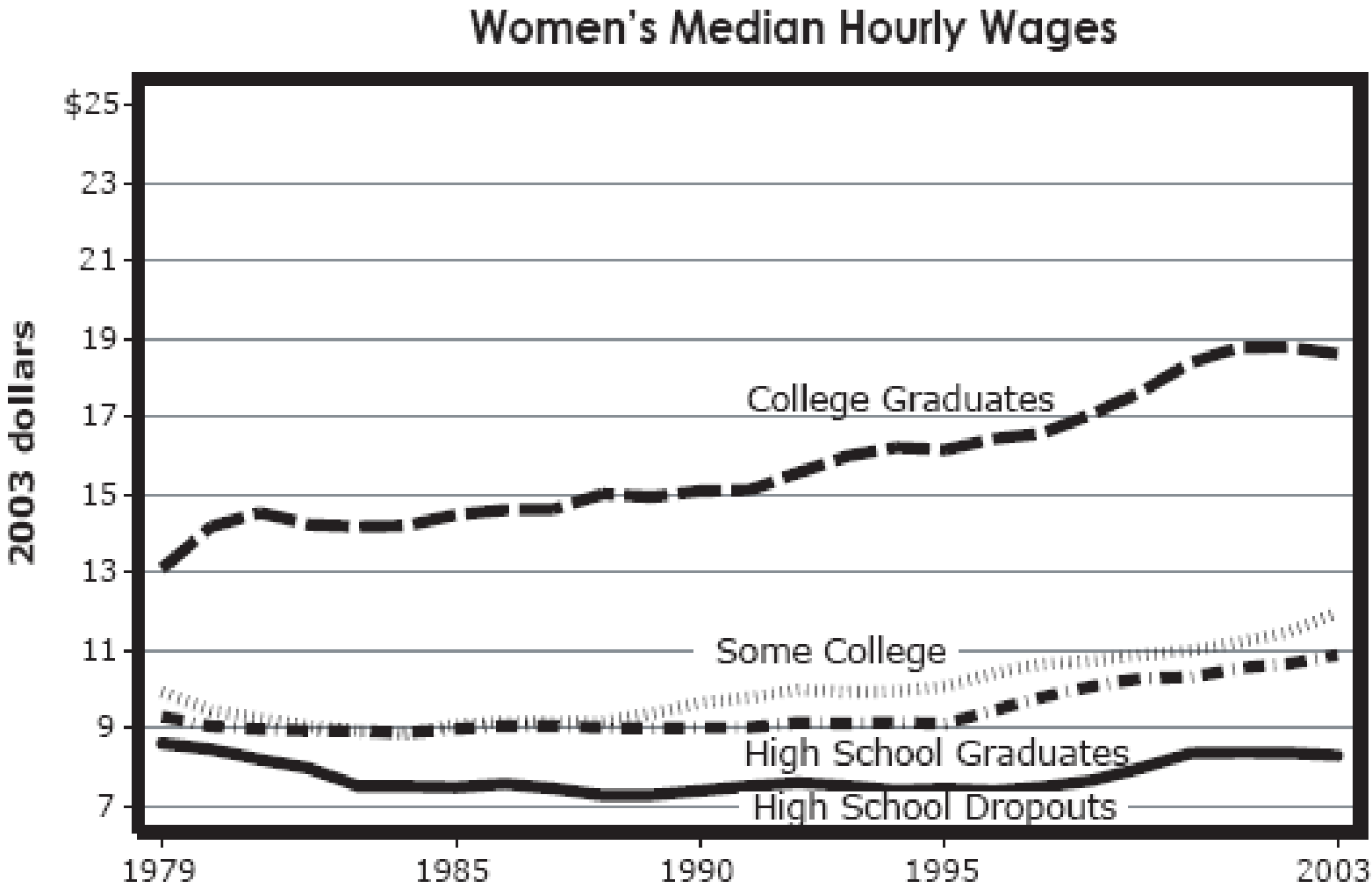
Women's Median Hourly Wages
2003 dollars
$25
23
21
19
17
15
13
11
9
7
College Graduates
Some College
High School Graduates
High School Dropouts
1979
1985
1990
1995
2003

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Labor Force Demographics: Age (2003)

	Wisconsin	U.S.
16-24 years	16.7%	15.1%
25-54 years	67.4%	69.8%
55 years and older	15.9%	15.1%

Education and Workforce Training Infrastructure

- UW System (13 four-year, 13 two-year campuses)
  - Research & development
  - Innovation & entrepreneurship
- UW Extension
  - Outreach to rural areas
- Technical College System
  - Design curricula to train future bioeconomy workers
- Department of Workforce Development
  - Job Centers, Workforce Development Boards across the state

Transportation Infrastructure

- **Highways**
  - 6th highest number of paved roads per capita
- **Rail**
  - 4 major RR, 3 regional RR, 4 local RR – serve every region of the state
  - 145M tons of cargo carried each year
- **Ports**
  - 15 commercial ports
  - 44M tons of cargo per year
- **Airports**
  - 134 public use airports
  - 122,000 tons of cargo; 5M people per year

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Moving Forward…

General Barriers to Bioeconomy Development

- Lack of capital financing and outside investment
- Lack of established market for products
- Existing subsidies to fossil fuel industry
- Lack of research and education
- Entrenched customs in agricultural economy
- Lack of coordination among key stakeholders
- Aging population, “brain drain”
- Need for high skilled workers to fill high-skill jobs

Promoting the Bioeconomy: Broad Policy Options

- Market Guarantees: Regulations governing access to the market and production or purchase obligations
- Financial incentives Industry standards, permitting, and codes
- Education and information campaigns
- Investment in research and development
- Investment in support infrastructure (education, workforce training, transportation, etc.)

Conclusions

To get on the bioeconomy train, Wisconsin must:

- **Take full advantage of existing resources**
- **Encourage and expand existing industries**
- **Encourage emerging industries**
- **Strengthen the educational, workforce, and transportation infrastructure that will anchor all future bioindustry development**

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